Appraisal Well Data Collection Requirements for Materials & Corrosion Risk Assessment, Concept Selection and Improved Asset Integrity

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ABSTRACT

Typically, when an appraisal well is drilled, the focus is on collecting
data critical to reservoir characterization such as fluid volumes,
temperature, pressure, and formation permeability/porosity in order to
evaluate the technical feasibility and economic viability of the field.
This data is often inadequate to conduct a thorough corrosion and
materials related risk assessment, particularly for nontraditional
applications, because evaluations like these are typically done much
later in the Project timeline. This paper discusses a number of corrosion
and materials related Project issues and related opportunities that may
improve commercial viability evaluations or more cost effective
concept selection for a field. As a result of the identified opportunities,
this paper presents a systematic approach to the improved collection
and testing of well data during appraisal well testing at a low additional
cost, which is highly beneficial to concept selection and lifecycle asset
integrity design.

KEY WORDS: Appraisal well testing, fluid sampling, well data
analysis, corrosion management, water chemistry

INTRODUCTION

An appraisal well is performed to gather information to help determine
the technical viability and economic potential of the field. The
information gathered provides insights enabling safe and efficient
commercialization of the field. Currently, the main information
gathered includes fluid volumes and composition, temperature,
pressure, and formation permeability/porosity to assist in predicting the
potential production and life. The aforementioned type of data may
often be inadequate in conducting a more than screening level
corrosion and materials risk assessment, particularly when
nontraditional applications are encountered. Additionally, the data
provided may be unreliable due to improper sampling and/or testing
procedures. Unreliable or insufficient data typically leads to overly
conservative design which is not cost effective. As reserve
development moves toward more challenging and complex
environments, the inadequacy of testing data and reliability can further
exacerbate the range of uncertainties effecting CAPEX/OPEX and
facilities integrity considerations.

When performed earlier, more accurate and more reliable definition of
reservoir corrosivity can translate to capturing life cycle integrity
improvements and cost opportunities savings in areas like material
selection requirements. These opportunities may include minimizing
the use of expensive Corrosion Resistant Alloys (CRAs), and enabling
more appropriate design life modeling, that form a basis for corrosion
control programs, such as corrosion inhibition.

According to Simmons, the total annual cost of corrosion in the oil and
gas production industry in 2008 was estimated to be $1.372 billion,
with $589 million in surface pipeline and facility costs, $463 million in
downhole tubing expenses, and $320 million in capital expenditures
related to corrosion. (Simmons, 2008) Although all costs relating to
corrosion cannot be eliminated, the collaboration and inclusion of
materials and corrosion data collection parameters and practices should
be considered for incorporation in appraisal well testing campaigns to
reduce future corrosion related costs.

In reviewing current sampling and testing practices, it has been
identified that minor improvements in sampling procedures, analysis
protocol and adding a limited number of lab tests, can improve data
accuracy and reliability for corrosion modelling and testing purposes
markedly. These improvements can be done at a relatively low cost and
minimal impact to the appraisal well job. The improvements proposed
may be common knowledge from a technical standpoint; however, the
industry still observes situations with costly impact that could have
been prevented with earlier involvement from Materials and Corrosion
functions.